Disc Brake System For Trailers

SERVICE MANUAL

LIPPERT COMPONENTS™

TABLE OF CONTENTS

Disk Brakes for Trailers **3**
Introduction **3**
Safety Information **3**
Part Identification **4**
Brake System Attributes **5**
Reversing valves **5**
Bleeding the Brake System **6**
Troubleshooting **7**
Preventive Maintenance **8**
Replacement Parts **8**
8,000 Lb. Disc Brakes With Oil Lubrication Operation & Service **9**
Getting Started – Set-up and Adjustment **9**
Bearing Lubrication - Oil **9**
Oil Cap and Oil Seal **9**
Periodic Bearing Inspection **9**
Spindle nut adjustment **10**
Disc Brake Pads **10**
Disc Brake Caliper **10**
Wheel Torque Specifications **10**

Disk Brakes for Trailers

Introduction

Combining years of experience in the trailer frame and recreational vehicle industry with the newest and most innovative technology, Lippert Components, Inc. steps up again with the addition of our new Disc Brake System for Trailers.
The following publication is designed to give the customer an easy-to-understand operation and service manual to provide useful and important information. The quality of the Lippert name and the finest materials utilized in the production of the Disc Brakes provide for the finest trailer brake systems in the industry.

Quality comes threefold in Lippert Components, Inc.

- The finest quality materials
- The latest technology and design
- The quality standards maintained from materials to final assembly

All three points provide the customer with the best product they can possibly buy and the satisfaction of knowing they can trust the equipment on which they have spent their hard-earned money.
Lippert Components, Inc. thanks you for purchasing our Disc Brake System. When you speak of Lippert Components, Inc., our quality stands beside you.

Safety Information

⚠WARNING

The "WARNING!" symbol is a sign that a service or maintenance procedure has a safety risk involved and may cause death or serious injury if not performed safely and within the parameters set forth in this manual.
Always wear eye protection when performing service or maintenance to the vehicle. Other safety equipment to consider would be hearing protection, gloves and possibly a full face shield, depending on the nature of the service.
This manual provides general service and maintenance procedures. Many variables can change the circumstances of the service procedure, i.e., the degree of difficulty involved in the service operation and the ability level of the individual performing the operation. This manual cannot begin to plot out procedures for every possibility, but will provide the general instructions for effectively servicing the vehicle. In the event the skill level required is too high or the procedure is too difficult, a certified technician should be consulted before performing the necessary service. Failure to correctly service the vehicle may result in death or injury.

The owner's manual for your unit may have more procedures for service and maintenance.

1. Installation, maintenance, adjustment or repair of LCI Braking System should be performed by qualified technicians only.
2. Be sure to support trailer with jack stands to safely perform brake installation, maintenance, adjustment or repair.
3. Always test and confirm that trailer brakes are operating properly after every hookup and before actual towing.
4. Know, or at least be familiar with, local and state laws regarding towed vehicle's brake system and any applicable laws and requirements. Remember to allow for extra stopping distance needed when towing a trailer.
5. Disc brakes generally require more hydraulic pressure than drum brakes. Verify that the hydraulic actuator will generate hydraulic pressure adequate to safely operate disc brakes.

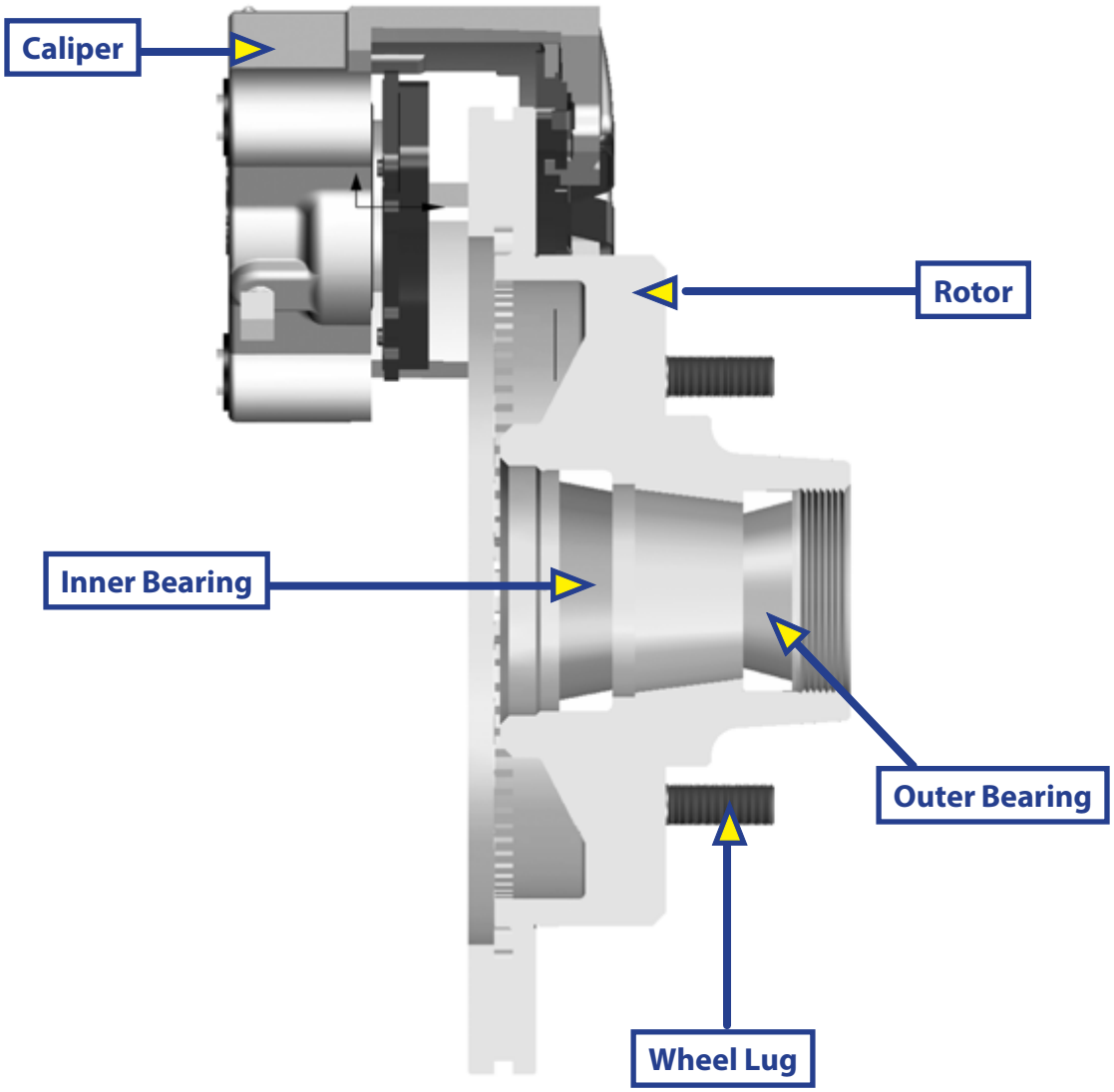
6. Scheduled inspections of the trailer's brake system should comprise the following:

A. Excessive or uneven wearing on the pads.
B. Excessive wear, scoring, excessive heat build up, cracks in or warping of rotor.
C. Correct fluid level in master cylinder.
D. Bolts firmly tightened.
E. Any fluid leaks around calipers or brake lines.

NOTE: Inspect all areas of the LCI Disc Brake System. Excessive wear on pads or damage to the rotors due to excessive pad wear will not be covered by the Lippert Components, Inc. Limited Warranty.

Part Identification

Fig. 1



Brake System Attributes

⚠WARNING

Do not use petroleum based grease! Caliper seals, o-rings, etc., are installed using silicone lubricants. Petroleum based lubricants are not compatible with these seals and o-rings and will cause failure.

Do not paint solenoid reversing valves! (for trailers with surge brakes only). This assembly uses a floating caliper. Paint will inhibit caliper movement on guide bolt sleeves and on the caliper mounting bracket.

Reversing valves

Utilizing surge brakes requires the use of a reversing valve. Disc brakes work equally well in forward or reverse and the reversing valve allows for proper function. Factory installed surge disc brake actuator is installed as standard equipment. Surge brake actuators without a solenoid reversing valve installed as standard equipment will require the valve to be retro-fit. The solenoids are wired into the tow vehicle's back-up light circuit. These solenoids are found in two styles:

Normally Open - This solenoid valve is installed near the master cylinder added inline.

Advantages
- Ease of installation; not time consuming.

Disadvantages
- In a downhill disposition, positive pressure will remain in the brake line. When the tow vehicle is shifted into reverse and the reverse lights are energized, the solenoid reversing valve traps the pressurized brake fluid and may result in failure to back up the trailer.
- In the event the trailer abruptly contacts an obstruction, such as a curb or speed bump, while in the process of backing up, force of this impact is transferred wholly to the master cylinder piston and can easily damage a seal.

Normally Closed - This solenoid valve is installed into a T-fitting from the master cylinder.

NOTE: A "three port" valve is also available to eliminate the T-fitting. A return line from the valve **MUST** be installed to return brake fluid into the master cylinder.

Advantages
- Eliminates the Disadvantages with "Normally Open" Valves.

Disadvantages
- Needs additional fittings, extra brake line, and requires drilling and tapping an access hole in the master cylinder for the return line.
- Some OEMs install the return line in the fill cap of the master cylinder. This may allow a moisture to get into the brake fluid.

NOTE:

1. Solenoid valves may be one wire (internally grounded case) or two wires (ungrounded case). On a two-wire model, they are not polarity specific.
2. Solenoid valves will have an IN and OUT to specify fluid flow direction. This configuration **MUST** be observed when plumbing a solenoid valve.
3. Older hydraulic drum brake systems needed a 10 - 12 psi residual pressure maintained to keep the wheel cylinder piston seals seated. To accomplish this, many surge brake actuators have a check valve with diaphragm installed just inside of master cylinder output port.
4. Disc brake systems subjected to residual brake line pressure will overheat the brakes and hubs. Be sure surge brake actuator is designed specifically for disc brakes and the check valve is rendered inoperative. Use an ice pick or awl to perforate the diaphragm.
5. Never tow a surge braked trailer if the tow vehicle's back up light circuit is ON at any time other than when the tow vehicle transmission is in reverse.
6. When bleeding a system with a normally closed solenoid reversing valve, bleed one cycle minimum, with 12 VDC applied to the solenoid. The possibility of trapping air at the valve will be eliminated.

Bleeding the Brake System

⚠ CAUTION

Use only DOT3 brake fluid.

1. Pressurize the brake lines according to actuator manufacturer's recommendations.
2. Air bubbles rise to the highest point in any fluid power line. Be sure the brake lines are level and avoid creating high points to hold air.
3. Make sure surge brake actuator calipers are as high as possible and actuator is as low as possible during bleeding process.
4. Use a small bleeder hose that will fit over the bleeder screw on one end and the other end in a clear container of brake fluid to observe bubbling.
5. Install bleeder hose on bleed screw on first caliper bled. Bleeding process works best by starting with the caliper furthest from the actuator.
6. When pressure is applied to the system, open the bleeder screw at the caliper, one turn. Any air and pressurized brake fluid will be vented through the orifice in the screw. Bleeding operation is complete when trapped air is purged from system. Be sure to close bleeder screw securely after each compression stroke of the master cylinder.
7. When bleeding is complete, master cylinder reservoir should be full and all bleeder screws secured closed.

NOTES:

- Bleeder screw should always point up.
- Bleed brake system thoroughly.
- LCI recommends the system to be re-bled after the first 100 miles.

Troubleshooting

* For trailers with surge brake actuators.

What Is Happening?	Why?	What Should Be Done?
Cannot back up surge braked trailer.	12 v. solenoid valve is inoperative.	Check tow vehicle back-up light circuit. Check 12 v. solenoid. (Should be able to hear a "click" when 12 v. DC is applied to lead wire.)
		Check connection to tow vehicle back-up light circuit.
		Check trailer ground connection (do not depend on hitch ball connection to provide ground.) Trailer should have dedicated ground wire connected to grounding lug.
Squeaking, clatter or chucking	This could be caused by a worn out shock absorber in the Surge Brake Actuator.	Replace per manufacturer's specifications.
	The linkage pivots on the brake actuator.	Lubricate per manufacturer's specifications.
	Loose hitch ball.	Inspect hitch ball and tighten or replace as required.
	Loose hitch.	Inspect hitch and tighten or repair as required.
	Hitch ball worn or too small.	Replace with properly sized and rated ball.
	A bent push rod in the shock absorber.	Replace per manufacturer's specifications.
	A bent master cylinder actuating rod.	Replace per manufacturer's specifications.
	A damaged coupler assembly.	Replace per manufacturer's specifications.
	Broken rotor.	Replace rotor and check calipers.
	Low brake fluid level in master cylinder.	Fill and bleed brakes. Replace or build actuator master cylinder.
	Worn out caliper pads.	Replace caliper pads and check rotors.
	Leaky caliper.	Replace or rebuild calipers. Clean other hardware.
	Leaky wheel bearing grease seal.	Replace grease seal and wheel bearings as required. Pack wheel bearings. Re-bleed as necessary. Clean other hardware.
	Caliper/Mounting bracket bolts may be loose.	Tighten to manufacturer's specifications and/or replace as necessary.
	Spindle nut may be loose.	Tighten to manufacturer's specifications and/or replace as necessary.
	Lug nuts may be loose.	Torque to manufacturer's specifications and/or replace as necessary.

What Is Happening?	Why?	What Should Be Done?
One brake overheating, side pull, poor brake performance.	Caliper piston not retracting.	Check for foreign material in brake line. Check for corrosion between caliper and piston. Check and rebuild or replace caliper. Bleed system.
	A bent guide bolt/caliper mounting bracket.	Replace as required.
	Side pull.	Check wheel bearings, caliper, rotor, and replace as required.
All brakes overheating, poor brake performance.	Foreign material in brake line.	Flush and clean thoroughly. Re-bleed system.
	Low hydraulic fluid level.	Fill with new brake fluid per manufacturer's specifications. Bleed brakes to eliminate any trapped air.
	Broken or pinched brake lines.	Replace or repair as required.
	Brake actuator frame damaged.	Replace actuator.
	Residual pressure in brake line.	Check Operating Manual for Electric Hydraulic Actuators. Check wheel bearings, caliper, and rotor and replace as required.

Preventive Maintenance

1. Visually inspect brakes before each trip.
2. After each hook-up, check trailer brake operation before travel.
3. Follow manufacturer's recommendations for use and replacement of brake fluid.
4. Wash brake assembly immediately after exposure to salt water or other corrosives.
5. Occasionally check hub and assemblies to see they are within normal operating ranges (130º - 175º F). Brake components may be much hotter than the hub or wheel, use caution during inspection.

NOTE: Refer to LCI's Trailer Axle Owners Manual for additional information regarding maintenance schedule, suspensions, bearing repack instructions and wheel torque recommendations.

Replacement Parts

For Axle Service & Warranty or a list of replacement parts, please contact:

Lippert Components, Inc.
Axle Division, Plant 45
2703 College Ave.
Goshen, IN 46528
574-971-4100 ext. 4925

8,000 Lb. Disc Brakes With Oil Lubrication Operation & Service

Getting Started – Set-up and Adjustment

For proper performance, all new axles should have the following checked at the specified intervals:

1. Check tire pressure: Set to manufacturer's recommendations, check weekly, check inflation pressure cold before operation.
2. Check lug nut torque: On first trip, tighten wheel lug nuts at start and at 10, 25 and 50 miles and until no torque loss occurs and full torque is maintained. Check lug nuts thereafter before each trip, after any excessive braking and following winter storage. Be sure to repeat procedure should a wheel ever be removed from the axle hub.
3. Oil level: Before every trip check to see that the oil level is up to the level indicated on the oil cap. A low level can indicate a seal or cap leak.

Bearing Lubrication - Oil

Your axle bearings are lubricated with a SAE 80-90W hypoid gear oil. Periodically check and refill the hub as necessary to the level indicated on the clear plastic oil cap. The oil can be filled through the cap by removing the rubber plug. In order to check oil level, do so after unit has been parked for a few minutes.

Recommended Oil Lube for axle bearings:
Oil designation: SAE 90, SAE 80W-90, SAE 75W-90
Approved Sources:

Union Oil Co	Unocal MP Gear Lube
Exxon Co	Gear Oil GX 80W-90
Mobil Oil	Mobilube SHC 75W-90
Pennzoil Co	Gear Plus 80W-90 GL-5
Gear Plus Super 75W-90	

Oil Cap and Oil Seal

The clear plastic oil cap should be tightened to 25 ft-lbs. Over-tightening can damage the sealing o-ring and cause an oil leak.

In order to remove hub/rotor assembly a gear puller may be required. The oil seal is a 2 part seal where the inside diameter of the seal presses onto the spindle journal and the outside diameter of the seal presses into the hub bore. Therefore a gear puller is the most efficient way to remove hub from spindle. A new oil seal **MUST** be installed before reassembly or the old seal will leak upon reinstallation and use. The National seal part number is W370219BG or Transcom part number is OB2233749 for reference. When reinstalling a new oil seal, be sure to correctly orientate the seal. Most are marked "AIR SIDE." This side **MUST** not be placed towards the oil and bearing or it will fail in service. Install new seal using a block of wood and hammer to drive the seal in the seal bore square until the outer face of the seal is flush with the seal bore face. Do not use permatex on rubber encased oil seals.

Periodic Bearing Inspection

A physical bearing inspection should be conducted every 15,000 miles. An inspection of the bearing condition can detect early bearing issues. Upon inspection bearings should look brand new and be able to be reassembled and used if in this condition. If discoloration, pitting, corrosion, flat spots or some abnormal condition is observed the bearing and race should be replaced at the same time. Bearings are available at auto part stores.

Bearing Part Numbers:

Outer bearing cone	02475
Outer bearing race	02420
Inner bearing cone	25580
Inner bearing race	25520

Spindle nut adjustment

The proper method to assemble the spindle nut is as follows:

1. After hub installation onto spindle, install outer bearing.
2. Install spindle washer and thread on spindle nut with slots facing outward.
3. Tighten spindle nut with a pair of slip joint pliers to approx 50 ft-lbs.
4. Back off torque usually ¼ turn so that you can finger tighten the spindle nut.
5. Finger tighten, drop cotter pin through slot and hole in spindle. If slot in nut does not align with hole in spindle, back nut off until it does, never tighten past finger tight.
6. Bend legs over end of spindle and be sure legs do not interfere with oil cap upon reassembly.

Disc Brake Pads

Disc brake pads are available through auto part stores. You can ask for disc brake pad kit MD215. Brake pads are a consumable item so be sure to visually check pads every 3,000 miles. Be sure to also check rotor surfaces visually when you are checking the brake pads. Deep groves developing on one or both rotor surfaces can indicate a caliper piston, slider bolt or residual pressure problem if this ever occurs. Brake rotors should be turned when disc brake pads are replaced.

Disc Brake Caliper

The proper mounting torque for the disc brake caliper mounting bolts is 40-50 ft-lbs. If these are removed for servicing the brake system, add blue thread locking compound to the threaded area of the bolt at time of reassembly. Also lubricate the inside of caliper bushings that the slider bolts go through. Be sure to only use silicone based grease. The rubber bushings are not compatible with petroleum based greases.

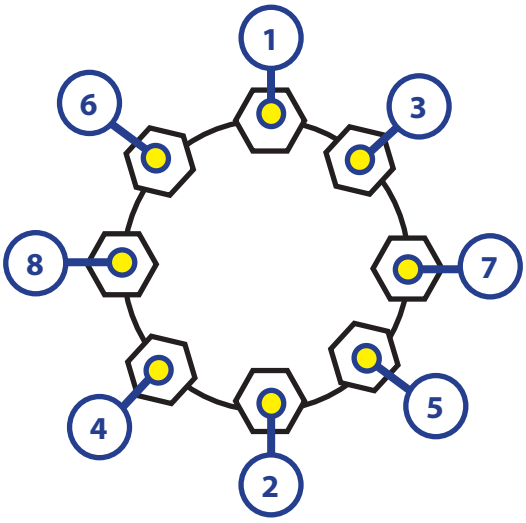
Wheel Torque Specifications

On first trip, tighten wheel lug nuts at start and at 10, 25 and 50 miles and until no torque loss is experienced. Be sure to repeat procedure should a wheel ever be removed from the axle hub.

Procedure:

1. Make sure vehicle has been pulled or backed straight before re-tightening to ensure tires/wheels do not have significant side loads being applied as would occur if unit was turned sharply before coming to rest.
2. Use a clicker or digital style torque wrench and appropriate 6 point socket. A short 3" or 6" extension maybe needed so that wrench and your hand will clear wheel. Keep extension length to a minimum.
3. Remove nut covers or wheel covers to access wheel nuts if equipped.
4. Set torque wrench to vehicle manufacturers specifications to check wheel nuts.
5. If wheel has been removed and is being reassembled, set torque to values listed below and torque wheel nuts in 2 stages.
6. Torque to value in criss-cross pattern shown below.
7. Reapply decorative trim covers if equipped.

Torque Sequence



LIPPERT COMPONENTS™

The contents of this manual are proprietary and copyright protected by Lippert Components, Inc. ("LCI"). LCI prohibits the copying or dissemination of portions of this manual unless prior written consent from an authorized LCI representative has been provided. Any unauthorized use shall void any applicable warranty. The information contained in this manual is subject to change without notice and at the sole discretion of LCI. Revised editions are available for free download from www.lci1.com.

Please recycle all obsolete materials.

For all concerns or questions, please contact
Lippert Components, Inc.
Ph: (574) 537-8900 | Web: www.lci1.com | Email: warranty@lci1.com